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URGENT TASKS IN DEVELOPMENT OF HEMATOLOGY AND BLOOD
TRANSFUSION TECHNIQUES IN THE USSR

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During the immediately preceding period Soviet medical science has made considerable progress in the development of work on the theoretical and practical problems of hematology and blood transfusion, particularly as far as the investigation of the physiology and pathology of hemopoiesis is concerned.

Thus, as a result of many-sided experimental investigations it has been established that the development of compensatory hemopoietic reactions is connected with the functional condition of the central nervous system (N. A. Fedorov, V. N. Chernigovskiy, and others). It has also been established that damage to various divisions of the nervous system as a rule results in the development of hypochromic anemia which, however, has a reversible character because of the great compensatory potentialities inherent in the blood formation system (N. S. Dzhevadyan, N. S. Rozanova, and others).

The role of the nervous system in the realization of the effect of humoral factors on hemopoiesis has been convincingly demonstrated. Thus, the development and activity of the hemopoietic factor is considerably modified when the stomach has been denervated and also whenever there are functional shifts in the activity of the cerebral cortex (A. M. Nemyatysheva, M. G. Kakhvelidze).

It was established that an overstrain imposed on the higher nervous activity of animals brings about premature development of experimental leukoses (M. O. Raushenbakh, Ye. I. Zharkova, M. N. Khokhlova).

Distinct progress has been achieved in the therapy of diseases of the blood formation system. Of great practical value are the new liver preparations, Antianemin and MZh, which exert a more active effect on hemopoiesis than Kampolon. These preparations are successfully used in the therapy of the Addison-Biermer disease and of macrocytic anemias. Vitamin B₁₂ is also very effective in the treatment of the Addison-Biermer disease. This vitamin has been obtained in work done at the Institute of Biochemistry imeni A. N. Bakh.

Of fundamental importance are new data which make it possible to regard leukosis as a process of the neoplastic type. It was possible to demonstrate that the psychophysiological and psychomorphological characteristics of leukocytes in leukosis patients resemble those observed in tumor cells. The more acute the course of the leukosis, the more distinctly expressed is the malignant character of the blood cells (E. I. Terent'yeva).

Special investigations have established that there are definite functional shifts in the hemopoiesis during hypertension, cancer, and other diseases (A. A. Bagdasarov, M. S. Dul'tsin).

Notwithstanding the progress reviewed above, some important problems of clinical and experimental hematology are still being investigated to an inadequate extent. The treatment of a number of hematological diseases is still being carried out purely symptomatically. For that reason, the most urgent and important task is the development of methods of treatment that are justified from the pathogenetic standpoint and creation of experimental biological models of leukoses, aplastic and hypoplastic anemias, and agranulocytoses. On the basis of investigations of this type, it is necessary to develop experimental therapy on a broad scale.

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It is necessary to do more sustained work on the differentiation of indications for the application of various means of therapy for chronic leukoses and to draw up instructions on methods of therapy for leukoses.

It is also time to launch extensive experimental and clinical investigations for the purpose of finding new chemotherapeutic agents and other agents for the treatment of hematological diseases as well as for the development of hemostatic agents (lagochilus and others). In doing this work, one should study not only the therapeutic effect of various preparations, but also the mechanism of their action.

The present day problems of the etiology, pathogenesis, therapy and prophylaxis of hematological diseases demand a deeper understanding of the intimate mechanism of the nerve regulation of hemopoiesis. Notwithstanding this, up to now the role of the nervous system in the regulation of the functions of hemopoiesis has been studied primarily in experiments. It is necessary to supplement this omission and to launch a many-sided investigation of the functional interrelationships between the nervous system and the system of blood formation. This work must be carried out from the many standpoints indicated and in close connection with the study of the functional condition of other organs and systems as well as in connection with investigations of metabolic processes.

During recent years great attention has been paid to important problems of the theory and practice of blood transfusion. At the Central Blood Transfusion Institute, the Khar'kov Institute, and other institutes of blood transfusion, successful investigations have been carried out which implement the corticovisceral theory of the mechanism of effects produced by blood transfusions. It has been found that after a blood transfusion the positive conditioned reflexes are strengthened and the processes of excitation and inhibition in the cerebral cortex are brought back to normal (N. A. Fedorov and his collaborators).

Much has been done in developing a rational system for the application of chemotherapeutic agents in shock, diseases of the liver and kidneys, gastrointestinal ulcers, surgical operations carried out on the cranium, lungs, and gastrointestinal tract, and also in splenectomies and cancer (A. N. Bakulev, A. V. Gulyayev, V. I. Kazanskiy, and others).

Great attention has been paid to prolonging the period for the storage of blood. Extension of the period during which blood can be stored has been achieved by prolonged maintenance of the processes of metabolism at definite levels and by stabilization of the protein system in erythrocytes (S. Ye. Severin, P. S. Vail'yev). Furthermore, conditions have been created which make it possible to preserve the erythrocytes in a state of anabiosis (A. D. Belyakov, P. I. Pokrovskiy, and others).

Successful work has been carried out in the preservation of individual blood components, i.e., erythrocytes, leukocytes, and plasma (F. R. Vinograd-Finkel', and others). New effective methods have been developed for the prolonged storage of erythrocytic mass and the preparation of large quantities of leukocyte suspension, a preparation which is very effective in leukopenic conditions.

It is difficult to overestimate the value which blood substitutes and therapeutic blood preparations have for public health. Investigation of the problems involved was started with the development of a method of production and application for therapeutic purposes of natural and dry plasma, this being the best blood substitute. This plasma [dry plasma?] has an excellent effect in cases of shock, hypoproteinemias, burns, etc. Plasma is often preferred to

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whole blood, for instance, in diseases of the liver and kidneys. To increase the therapeutic properties of serum and plasma, methods have been developed for saturating them with hemoglobin, vitamins, antibiotics, and hypnotics.

Various blood preparations, for instance gamma globulin, fibrin film, and hemostatic sponge are being introduced more and more widely into medical practice (G. Ya. Rozenberg, A. N. Filatov, and others). Some of these blood preparations serve as substitutes for antimeasles serum and for the treatment of poliomyelitis and other infectious diseases, while others are applied in the therapy of burns, in neurosurgical operations, and for the treatment of parenchymatous and venous hemorrhages.

Of great practical importance is the problem of artificial blood substitutes. Thus, many substitutes of the salt solution type resemble blood plasma in their inorganic composition. Still more effective than substitutes of the salt solution type are the salt-colloidal substitutes. Particular attention must be paid to the progress achieved by Soviet scientists in the development of blood substitutes prepared from heterogenous protein (N. A. Fedorov, P. S. Vasil'yev, M. A. Lisitsin, I. R. Petrov, L. G. Bogomolova, and others).

In a number of therapeutic institutions N. G. Belen'kiy's therapeutic serum is used as a blood substitute. While Belen'kiy's therapeutic serum has a positive effect on a number of pathological processes, such as shock, blood losses, hypoproteinemia, etc., this serum is not devoid of species specificity and has anaphylactogenic properties. After primary transfusions and particularly after repeated transfusions of this serum with long intervals between transfusions, reactions and even complications occurred. It is consequently necessary to perfect the technology of the production of such preparations to eliminate anaphylactogenic properties.

Much has been done as far as the preparation of synthetic organic blood substitutes is concerned. With a view toward preparing them, various organic compounds are being studied.

Of great importance are antishock solutions. They are prepared with the possibility in mind that they act on nerve mechanisms. This is due to the fact that USSR scientists (N. N. Burdenko, E. A. Asratyan, I. R. Petrov and others) have convincingly demonstrated the important role of the neurogenic factor in the development of the state of shock. This explanation of the nature of shock is different from that given by foreign scientists, who assume that the state of shock is produced by the loss of plasma and by intoxication.

In the new antishock liquids drugs are contained which produce protective therapeutic inhibition of the central nervous system (E. A. Asratyan, N. A. Fedorov, A. N. Filatov, P. L. Sel'tsovskiy, D. M. Grozdov, and others).

The progress achieved in the field of blood transfusion does not yet by far correspond to the increased demand put to this method by the theory and practice of Soviet medicine.

Our immediate task is to introduce into medical practice highly effective heterogenic protein liquids which are devoid of anaphylactogenic and toxicogenic properties. Of great importance is also the development of methods for the production of synthetic organic compounds. All these preparations are to be used not only for the replacement of natural blood substitutes, but also in the capacity of special therapeutic agents. It is also necessary to continue to perfect the methods of production so as to insure prolonged storage and improvement of the therapeutic properties of natural and dried plasma and also of serum, these being valuable natural blood substitutes.

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The task of future scientific research will be to find new, more effective antishock liquids of the salt and colloidal types formulated under the utilization of heterogenic proteins and synthetic preparations.

It is also time to finally complete the work on the comparative evaluation of the therapeutic activity of many blood substitutes, antishock solutions, and hemostatic solutions and give an explanation that is based on the pathogenetic processes for their therapeutic action. Another object for investigation ought to be the problem of parenteral protein nutrition, which plays an important role in the therapy of many diseases.

Problems of the nature of blood transfusion are closely connected with the problem of the interconnection between the cerebral cortex and internal organs. In addition to an investigation of the nervous system, it is necessary to investigate simultaneously the condition of various organs and systems, or metabolic processes, and of the permeability of blood capillaries, utilizing in work of this type the tracer method, the method of electrophoresis, and other new methods of investigation.

Particular attention should be paid to a thoroughgoing development of differentiated indications for the application of hemotherapeutic agents in various pathological processes. One must define exactly what place blood transfusion should occupy in the system of the manifold treatment of suppurative-septic conditions, of traumatic, surgical, posthemorrhagic, and burn shock, and also of diseases of the cardiovascular system. The indications and contraindications for the application of hemotherapy in infectious diseases have not been defined adequately. The same applies to indications for the intra-arterial transfusion of blood.

An important field for investigation is the new serological blood factors and research on their role in the development of posttransfusion reactions and complications. Research of this type permits the more thorough investigation of the pathogenesis of such complications and the development of effective methods for their prophylaxis and treatment.

One must actively search for methods of prolonging the periods during which blood to which stabilizers have been added can be stored. At the present time great possibilities are being opened for the prolonged preservation of blood by using substances which delay the histolysis of tissues. As a result of the use of such substances the activity of enzymes which participate in the aseptic autolysis of cells is suppressed.

Of great significance is the completion of the development of new methods for the preservation of blood which have been proposed by the Central Institute of Blood Transfusion and the Leningrad Institute of Blood Transfusion.

An important factor in the organization of measures in the field of hematology and blood transfusion will be furnished by the creation of small hematological hospitals attached to republic institutes and major blood transfusion stations and also by the opening of hematological cabinets at large polyclinics, so that dispensary treatment of patients with diseases of the hemopoietic system will be possible.

It is important to expand and improve the training of physician-hematologists by creating appropriate courses at the institutes of advanced training for physicians.

The necessity has arisen for the publication of a special journal on hematology and blood transfusion, which would contribute to the fruitful exchange of experience and timely introduction into practice of scientific achievements.

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Finally, it is necessary to recruit on a large scale scientific collaborators who are active at various clinics of medical and higher educational institutions and related scientific research institutes so that they may conduct scientific research work in the field of hematology and blood transfusion.

All these immediate problems of the highly important medical field being reviewed will be discussed at the 32nd Expanded Plenary Session of the Scientific Council, Central Institute of Hematology and Blood Transfusion, in which representatives of blood transfusion organizations from 80 cities of the USSR will participate. This plenary session will open within a few days.

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